**Cancellation
Date: 8/04/01**

SUBJ: GUIDELINES FOR DETERMINING THE LEVEL OF FEDERAL AVIATION
ADMINISTRATION (FAA) INVOLVEMENT IN SOFTWARE PROJECTS

1. **PURPOSE.** This notice provides guidelines to Aircraft Certification Service (AIR) field offices (i.e., Aircraft Certification Offices (ACO), Manufacturing Inspection District or Satellite Offices (MIDO/MISO), and Certification Management Office or Certification Management Unit (CMO/CMU)) and to Designated Engineering Representatives (DER) regarding the Federal Aviation Administration's (FAA) level of involvement in software-intensive projects. Advisory Circular (AC) 20-115B, "RTCA, Inc. Document RTCA/DO-178B," recognizes RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification, as an acceptable means of compliance for obtaining the Federal Aviation Administration's (FAA) approval of software in airborne systems and equipment. DO-178B addresses the certification liaison process but does not specify criteria for the FAA oversight. These guidelines are applicable to the approval of airborne systems and equipment and the software aspects of those systems related to type certificates (TC), supplemental type certificates (STC), amended supplemental type certificates (ASTC), amended type certificates (ATC), and Technical Standard Order Authorization (TSOA).

2. **DISTRIBUTION.** This notice is distributed to the branch level in Washington Headquarters Aircraft Certification Service, section level in all Aircraft Certification Directorates, all National Resource Specialists (NRS), all ACO's, all Manufacturing Inspection Offices (MIO), all MIDO's/MISO's, all CMO's/CMU's, and all Flight Standards District Offices (FSDO). Additional limited distribution should be made to the Air Carrier District Offices, the Aeronautical Quality Assurance Field Offices, and the FAA Academy.

3. **RELATED PUBLICATIONS.**

    a. Advisory Circular 20-115B, "RTCA, Inc. Document RTCA/DO-178B," dated January 11, 1993.

    b. RTCA, Incorporated, document RTCA/DO-178B, "Software Considerations in Airborne Systems and Equipment Certification," dated December 1, 1992.

    c. FAA Job Aid, "Conducting Software Reviews Prior to Certification," dated June, 1998.

4. **BACKGROUND.** Section 9 of DO-178B describes the certification liaison process. The certification liaison process is the vehicle to establish communication and understanding between the applicant and the certification authority. Sections 9.2 and 10.3 of DO-178B state that the certification authority may review the software life cycle processes and data to assess

compliance to DO-178B. Notice 8110.81 provides information regarding the software review process; however, it does not address the criteria used to determine when or how many software reviews the FAA or DER, when delegated, needs to perform. This notice documents the criteria for determining when, to what extent, and the areas for which FAA personnel should be involved in determining the software aspects of compliance for a certification program. "When" the FAA should be involved is that time during the software life cycle at which an assessment can be made to determine that the project is progressing toward approved plans and procedures (e.g., planning, development, integration/verification, or final software approval). The "extent" is how much and how often the FAA is involved in the project (e.g., how many on-site reviews are conducted, how much oversight is delegated to DER, and how much and what types of applicant data is reviewed, submitted, recommended for approval and approved). The "areas" for FAA involvement are the parts of the software processes where the FAA should focus their involvement to ensure satisfaction of the appropriate objectives of DO-178B for the software level (e.g., focus on plans, design, code, etc.).

5. DISCUSSION. This section discusses the criteria used to determine the FAA involvement in a project. Ideally, an assessment should be carried out and documented at the beginning of each software development project in order to enable the FAA and applicant to plan and address the project details as early as possible. The assessment outcome will result in a "HIGH," "MEDIUM," or "LOW" level of FAA involvement (LOFI). The level of involvement outcome will determine the FAA and/or DER's involvement in software reviews, the times throughout the project for FAA and/or DER involvement, designee delegation, etc. There are two major areas of criteria:

   a. Software Level Criteria. The first criterion to consider in determining the LOFI for the software aspects of a project is the software level of the system being developed or modified. As a starting point, the software level criteria could be applied as shown in Table 1. For example, a Level D software project would initially indicate a "low" level FAA involvement; however, a Level A project might lead to "HIGH" or "MEDIUM" level of FAA involvement.

TABLE 1. SOFTWARE LEVEL CRITERIA

DO-178B Software Level	Level of FAA Involvement
D	LOW
C	LOW or MEDIUM
B	MEDIUM or HIGH
A	MEDIUM or HIGH

   b. Other Relevant Criteria. As can be seen from Table 1, there is ambiguity for certain software levels. Therefore, it is necessary to look at other relevant criteria when determining the LOFI in the software aspects of a project. The criteria are summarized in Table 2. Procedures for how to use Table 1 and Table 2 criteria are described in section 6 of this notice.

TABLE 2. OTHER RELEVANT CRITERIA

	CRITERIA	Scale MIN.		MAX.	Score
1.	**Applicant/Developer Software Certification Experience**				
1.1	Experience with civil aircraft and systems certification.	Scale: 0 5 # projects: 0 3-5		10 6+	
1.2	Experience with DO-178B.	Scale: 0 5 # projects: 0 2-4		10 5+	
1.3	Experience with DO-178 or DO-178A.	Scale: 0 3 # projects: 0 4-6		5 7+	
1.4	Experience with other software standards (other than DO-178 [ ])	Scale: 0 2 # projects: 0 4-6		4 7+	
2.	**Applicant/Developer Demonstrated Software Development Capability**				
2.1	Ability to consistently produce DO-178B software products.	Scale: 0 5 Ability: Low Med		10 High	
2.2	Cooperation, openness and resource commitments	Scale: 0 5 Ability: Low Med		10 High	
2.3	Ability to manage software development and sub-contractors	Scale: 0 5 Ability: Low Med		10 High	
2.4	Capability assessments (e.g., SEI CMM, ISO 9001-3, IEC)	Scale: 0 2 Ability: Low Med		4 High	
2.5	Development team average relevant experience	Scale: 0 5 Ability: < 2 yrs 2-4 yrs		10 > 4 yrs	
3.	**Applicant/Developer Software Service History**				
3.1	Incidents of software-related problems. (as a percentage of affected products)	Scale: 0 5 Incidents: > 25% > 10%		10 None	
3.2	Company management and support of designees	Scale: 0 5 Quality: Low Med		10 High	
3.3	Company software quality assurance organization and configuration management process	Scale: 0 5 Quality: Low Med		10 High	
3.4	Company stability and commitment	Scale: 0 3 Stability: Low Med		6 High	
3.5	Success of past company certification efforts	Scale: 0 3 Success: None >50%		6 All	
4.	**The Current System and Software Application**				
4.1	Complexity of the system architecture, functions and interfaces	Scale: 0 5 Complex: High Med		10 Low	
4.2	Complexity & size of the software and safety features	Scale: 0 5 Complex: High Med		10 Low	
4.3	Novelty of design and use of new technology	Scale: 0 5 Newness: Much Some		10 None	
4.4	Software development and verification environment	Scale: 0 3 Environ: None Older		6 Modern	
4.5	Use of alternative methods or additional considerations	Scale: 0 3 Standard: Much Little		6 None	

TABLE 2. OTHER RELEVANT CRITERIA (CONTINUED)

5.	Designee Capabilities		
5.1	Experience of designees with DO-178B.	Scale: 0 5 10 Projects: <5 5-10 >10	
5.2	Designee authority, autonomy and independence.	Scale: 0 5 10 Autonomy: None Self-starter Outgoing	
5.3	Designee cooperation, openness and issue resolution effectiveness.	Scale: 0 5 10 Effectiveness: Non-Responsive Responsive Cooperative & Outgoing	
5.4	Relatedness of assigned designee's experience.	Scale: 0 5 10 Related: None Somewhat Exact	
5.5	Designees current workload on project and other projects.	Scale: 0 5 10 Workload: High Medium Low	
5.6	Experience of designees with other software standards (other than DO-178[ ]).	Scale: 0 3 5 Projects: <5 5-10 >10	

Total Score Result (TSR): _____

c. <u>An Exception</u>. If a software project has issues that may require new FAA policy (e.g., new technology, new design methods, unusual tools, etc.,) the LOFI may be higher. Typically, if a policy issue is involved for Level A and B systems, the LOFI is "HIGH." For Level C and D systems involving a policy issue, the LOFI is typically "MEDIUM."

6. PROCEDURES. This section discusses the guidelines for using the Table 1 and Table 2 criteria for a TC, ATC, STC, or ASTC project in order to determine the FAA involvement in the software aspects of certification.

> NOTE: TSO projects are discussed in Section 7a of this notice, since there are some special considerations regarding FAA oversight of TSO projects.

a. At the beginning of a TC, ATC, STC, or ASTC project involving software, the ACO Aviation Safety Engineer (ASE), project DER (if applicable), MIDO/MISO Aviation Safety Inspector (ASI) (if applicable), and applicant should work together to assess the project's needs and the FAA's involvement. The software level is typically determined early in the program and provides an idea of the project's needs in terms of safety. Table 1 indicates a typical relationship between software level and FAA involvement; however, the software level only provides a rough indicator. There are numerous other criteria that help to fine-tune the LOFI assessment.

> NOTE: There are special considerations to be addressed if an applicant does not inform the FAA of a project early in the software life cycle. These special considerations are addressed in section 7c of this notice.

b. If the Table 1 assessment leaves some ambiguity or uncertainty in the LOFI (e.g., it's a Level A, B, or C system), Table 2 may be used to further assess the LOFI. The scale for scoring each of the criteria in Table 2 has weighted minimum and maximum values and any value within the scaled range can be selected for scoring the applicant or developer for the criteria. For example, criteria 1.2, "Experience with RTCA document DO-178B," is more critical

(i.e., weighted higher) than criteria 1.4, "Experience with other software standards", and the applicant or developer could be scored with any value in the range from "0" (zero projects using DO-178B) to "10" (5 or more completed projects with DO-178B), as compared to criteria 1.4 where the range of values is only "0" to "4."

c. For projects where the software level is A, B or C, use the criteria in Table 2 to determine a Total Score Result for the project. To assess the project using Table 2, a number of means may be used either alone or in combination:

(1) Have the ASE who is most familiar with the applicant or developer determine a score for the criteria.

> NOTE: The developer is the company, not necessarily the applicant, where the software development activities will be taking place.

(2) Research past performance of the applicant and developer based on previous projects' successes and problems, past reviews and audits, in-service problems, and other ACO ASE's and MIDO/MISO/CMO/CMU ASI's experiences.

(3) Request an assessment of the project and developer be conducted by the designee assigned to the project.

d. A combined assessment of the applicant and the developer project may work for most projects. However, it may be necessary to perform a separate assessment for the applicant and one for the software developer. If the determination of the LOFI for the applicant and for the developer differ, then use the higher determination (i.e., more involvement).

e. To determine the LOFI for a specific software project, score the applicant and/or developer for each of the criteria according to the scale provided and record the score in the Score column in Table 2. After recording these scores, total the values in the score column to determine the Total Score Result. This Total Score Result can then be used to determine the HIGH, MEDIUM or LOW category for level of FAA involvement using Table 3.

TABLE 3. LEVEL OF INVOLVEMENT DETERMINATION

Total Score Result (TSR) (from Table 1)	Software Level A	Software Level B	Software Level C	Software Level D
$TSR \leq 80$	HIGH	HIGH	MEDIUM	LOW
$80 < TSR \leq 130$	HIGH	MEDIUM	MEDIUM	LOW
$130 < TSR$	MEDIUM	MEDIUM	LOW	LOW

> NOTE 1: If the TSR is close to the TSR boundary values (that is, 80 or 130), use the software level to determine the most appropriate level of FAA involvement.

> NOTE 2: If any criterion in Table 2 is not applicable, the assessor

may use the average value or adjust the Table 3 boundaries.

f. As mentioned in section 5c of this notice, projects with policy issues require special consideration. Typically, Level A or B projects with policy issues require HIGH LOFI, regardless of the Table 3 outcomes. Also, Levels C or D projects typically require at least MEDIUM LOFI, if policy issues exist.

g. The amount of involvement by the FAA of the applicant and/or the software developer during a software project should be determined early in the project. The results of the assessment should provide input to the Certification Project Plan (CPP) and to the applicant. The HIGH, MEDIUM or LOW category determination should provide the basis for FAA involvement in the project. This determination would include the amount of mentoring and coaching required, the number and types of software reviews, the amount of designee delegation, and the number and types of software life cycle data to be reviewed, submitted, recommended for approval, and approved. Examples of the meanings of HIGH, MEDIUM or LOW are:

TABLE 4. TYPICAL PROGRAM DECISIONS BASED ON LOFI OUTCOME

Level of FAA Involvement	Typical Program Decisions
HIGH	▪ Minimal delegation to designees (i.e., Designee may recommend approval of some data and approve other type design data). ▪ NRS, Technical Specialist (TS), Directorate staff, and/or Headquarters (HQ) staff involvement is likely. ▪ FAA involvement throughout the software life cycle, including mentoring, on-site reviews and desk reviews (recommend no less than 2 on-site reviews). ▪ Submittal of all plans: Plan for Software Aspects of Certification (PSAC), Software Development Plan (SDP), Software Verification Plan (SVP), Software Configuration Management Plan (SCMP), and Software Quality Assurance Plan (SQAP). ▪ Submittal of Software Accomplishment Summary (SAS), Software Configuration Index (SCI) and Verification Results. ▪ Submittal of DO-178B Objectives Compliance Matrix (reference FAA Job Aid, "Conducting Software Reviews Prior to Certification," dated June 1998), which may be submitted as part of the SAS.
MEDIUM	▪ Moderate delegation to designees (i.e., Designee may recommend approval of PSAC and SAS; Designee may approve SCI; and Designee may approve SVP, SDP, SQAP, SCMP, and other data). ▪ Involvement at least initially (planning, regulation and policy interpretation, some mentoring) and toward the end of the project (final compliance). ▪ NRS, TS, Directorate staff, or Headquarters staff involvement may be needed. ▪ Conduct at least 1 on-site review but mostly desk reviews of data. ▪ Require submittal of PSAC, SCI, SAS. ▪ May request submittal of SVP, SQAP, SCMP, and SDP.

TABLE 4. TYPICAL PROGRAM DECISIONS BASED ON LOFI OUTCOME

(CONTINUED)

LOW	- Maximum delegation to designees (i.e., Designee may recommend approval of PSAC and designee may approve all other data/documents.) - Minimal FAA involvement (e.g., no on-site reviews, little or no desk reviews). - Rarely need NRS, TS, Directorate staff, or HQ staff involvement. - Submittal of PSAC, SCI, and SAS.

> NOTE: Table 4 is only an example of High, Medium, and Low decisions. Each program will have slightly different needs.

h. The ACO ASE may document the anticipated LOFI for each project using the LOFI worksheet in Appendix 1, Level of FAA Involvement (LOFI) Worksheet. This worksheet may be provided to the FAA project manager to document the project plans.

7. SPECIAL CONSIDERATIONS. There are a number of special considerations that may need to be considered on a program:

a. <u>TSO Projects</u>. Many TSO manufacturers do not use DER's in their software development project oversight; therefore, the criteria 5.1 through 5.6 in Table 2 may not seem applicable for TSO projects. However, even if a DER is not involved in the project, the applicant should have one or more individuals who have qualifications similar to that of the software DER (e.g., experience with DO-178B, experience in software development, etc.). This will provide an independent view of the project and assures the DO-178B objectives are satisfied. For TSO projects, the process in section 6 of this notice may still be applied; however, the "designee" in Table 2 may be replaced with "applicant personnel responsible for software oversight."

> NOTE: Some TSO applicants do not inform the FAA of their project activities until submittal of the data package. This can lead to problems for both the FAA and applicant. Every effort should be made by both the FAA and the applicant to address issues early in the program. This typically leads to fewer problems and more rapid approval when the data is submitted.

b. <u>Late Application Submittals</u>. For late application submittals, it may be necessary for FAA personnel to spend a significant effort in a relatively short period of time in order to find compliance. This is not a good scenario because it typically results in FAA personnel sacrificing planned activities for these "pop-up" activities and can have a significant detrimental impact on the person and the quality of their involvement. Late submittals should be discouraged and the LOFI in the project should be planned considering previous commitments and the applicant informed of the schedule for monitoring their project and estimated approval dates for their data. Committed levels of involvement for planned projects should not be sacrificed for those who fail to plan. However, because the project is complete or nearly complete, LOFI for the project should be modified. However, the quality of the data submittals should not be compromised. The FAA should ensure that applicants are informed of the significant risk to their projects when coordination with the FAA has not been addressed early in the project.

c. <u>Mid-Project Adjustments</u>. The criteria are based primarily on an assessment and determination in the early part of the certification program. During the course of the certification program and software development, the applicant and developer should be monitored. If unforeseen problems arise, it may be necessary to re-evaluate the LOFI determination and to adjust the involvement level. Likewise, some applicants may make changes in a project that will lower the LOFI (e.g., add experienced DER's, change to proven technology, etc.).

d. <u>Program Risk</u>. If during the course of the project, project risks such as schedule slides or reduced or deferred functionality occur, it may be necessary to evaluate the applicant's and/or developer's risk management strategy and adjust the LOFI and monitoring.

e. <u>FAA Workload</u>. Of course, FAA personnel involved in multiple projects must base their decisions for the amount of their involvement in a particular project relative to all their commitments for project involvement and other job activities. Committing to multiple HIGH level of involvement projects, especially if several involve visits to remote sites, may not be practical or prudent. Generally, the software level and system novelty will be the crucial determinants for which projects get more involvement and which get less, for example, on-site reviews for Level A systems, and desk reviews or no reviews for Level D systems. Excessive workload should be reported to management to determine the best course of action and identify additional staffing needs. It may be necessary to utilize personnel from other offices in some cases (e.g., Headquarters, Directorates, and other ACO's).

f. <u>FAA Resources</u>. In addition to workload, the determination for LOFI must consider available resources such as travel funds for conducting on-site reviews. If an ASE has too many HIGH LOFI projects, funding may not be available to realistically support planned activities. However, the ASE may also be able to use this assessment as a means to justify additional resources. Appendix 2, Level of FAA Involvement - Example 1, Appendix 3, Level of FAA Involvement - Example 2, and Appendix 3, Level of FAA Involvement – Example 3 contain some example project scenarios and assessments. These are only examples but do provide some realistic applications for better application of the guidelines in this notice.

8. CONCLUSION. This notice provides guidance in terms of goals, criteria, and approach to use in order to ensure a consistent, standard process for determining the level of FAA involvement in the software aspects of TC, STC, ATC, ASTC, and TSO projects. The information and procedures described in this notice promote clarification and consistent application of AC 20-115B but does not replace or supersede AC 20-115B.

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APPENDIX 1. LEVEL OF FAA INVOLVEMENT (LOFI) WORKSHEET

Applicant: _____   **Project Name/Number:** _____

ACO Engineer: _____   **System Type:** _____

MIDO/MISO Inspector: _____   **Software Level:** _____

DER Name: _____   **Date of Assessment:** _____

TSR (from Table 2): _____   **Other Info:** _____

Resulting LOFI: _____   **Policy Issues:** _____

Plan Based on LOFI Assessment: (e.g., number of FAA on-site reviews, number of FAA desk reviews, data to be submitted to the FAA, delegation to DERs, etc.)

Mid-Project Corrections: (based on project improvements or problems)

Actual Project Results: (e.g., number of FAA on-site reviews, number of FAA desk reviews, data submitted to the FAA, delegation to DERs, etc.)

APPENDIX 2. LEVEL OF FAA INVOLVEMENT – EXAMPLE 1

1. COMPANY X OVERVIEW: Applicant company X is applying for approval of a product that is usually approved for STC and installed on in-service aircraft. The equipment provides additional capability highly desirable by airlines. Company X has prior STC approvals on a number of aircraft and recently upgraded the software aspects of their product to RTCA DO-178B Level A criteria. In past programs, they have consistently demonstrated their willingness to commit the necessary resources and change their processes to utilize new technologies while maintaining a quality product and satisfying certification requirements.

Company X's product service history indicates almost no in-service difficulties with their products and their technology and system architecture are fairly stable. Replacement of obsolete parts is being planned and seemingly being well managed. They appear to have a stable in-house process for managing changes, even though almost each different aircraft installation requires some changes to the software. The development and verification environment is state-of-the-practice and new tools are introduced when economically advantageous. The company contracts through job placement agencies for low-level software testers.

Company X has 3 company designees on-site, 2 with software authority and 1 with electrical system authority, and the company occasionally contracts with a consultant DER for system approvals. One of the software DERs is very experienced and the other has been a DER for less than a year. The experienced software DER also is the manager for the software verification group, part of the engineering organization, and the less experienced software DER is in the company's SQA organization, which is independent of the engineering organization and has highly qualified and experienced personnel.

2. COMPANY X ASSESSMENT: An experienced software ASE involved with several previous projects for the company, and having previously conducted 2 on-site reviews, assesses company X on a new project. The results of the assessment:

1 criteria score:	20	4 criteria score:	26
2 criteria score:	21	5 criteria score:	38
3 criteria score:	36	Total score result:	141

3. LEVEL OF FAA INVOLVEMENT FOR COMPANY X: Using Table 3 with a Level A system and TSR of 141 indicates that the minimum level of FAA involvement should be MEDIUM. There would be no need for NRS or TS support, unless the company proposes to introduce some novel technology into their product or methods into their processes. For this project, the ACO may elect to perform one on-site review and some desk reviews, depending on their workload. Much of the data approval could be delegated. However, because it is a level A software project in the system, approval of the software accomplishment summary should be reserved by the ACO.

APPENDIX 3. LEVEL OF FAA INVOLVEMENT – EXAMPLE 2

1. COMPANY Y OVERVIEW: Applicant Company Y is applying for approval of equipment that is usually approved by TSO and then the installation by STC on new and in-service aircraft. The equipment provides additional capability highly desirable by airlines. Company Y has prior TSO approvals and a number of subsequent aircraft installation approvals. The product was originally developed as a prototype and the company claims that they have upgraded the software aspects of their product to RTCA DO-178B Level C criteria. In past programs, the company has been hesitant to allow certification authorities to perform on-site reviews and seems to prefer discussion rather than committing resources and changing their processes to comply with certification requirements.

Their early product service history indicated nuisance shutdowns and questionable performance but more recent service indicates almost no in-service difficulties. Each different aircraft installation requires significant changes to the software. However, the system technology and architecture appear fairly stable even though somewhat complex. They claim that they cannot afford to address the parts obsolescence issue immediately but say they are looking into it. The results of several on-site reviews attempted by various ASEs were inconclusive. One of the ASEs interviewed stated that the company used up the entire 3 days of the software review by having their managers and process focal points make unsolicited presentations. Company Y has been sold to three different parent companies in the past 7 years and rumor has it that if they do not turn profitable soon, they will be sold again or shut down. Company engineers are not assigned to specific projects, but project managers draw from a "pool" of engineers. The company received a Software Engineering Institute Capability Maturity Model (SEI CMM) assessment level of 2 three years ago.

Company Y has 2 company designees on-site, 1 with software authority and 1 with electrical system authority. Both have been there for over 20 years and the system DER is good friends with the ACO manager. The manager of the SQA organization, who was very experienced and software competent, was recently fired. A successor has not yet been named.

2. COMPANY Y ASSESSMENT: An experienced ASE who had been involved with 2 previous projects with the company assessed Company Y using Table 2. The results of the assessment:

1 criteria score:	11	4 criteria score:	24
2 criteria score:	8	5 criteria score:	27
3 criteria score:	15	Total score result:	85

3. LEVEL OF FAA INVOLVEMENT FOR COMPANY Y: Table 3 would indicate a MEDIUM level of FAA involvement for this company with some delegation. There would be no need for NRS or TS support, unless the company proposes to introduce some novel technology into their product or methods into their processes. Because the scores indicate inadequacies in their software experience and development capability and service history, FAA involvement is warranted. However, because the current product is a derivative of a previously TSO-approved system and the software is level C, a level of FAA involvement of MEDIUM is probably

APPENDIX 3. LEVEL OF FAA INVOLVEMENT – EXAMPLE 2 (CONTINUED)

appropriate. The ACO should be involved early in the project and state their expectations to the applicant very clearly. If possible, an on-site review should be performed midway through the project. When submitted with the TSO package, the ACO should perform an extensive desk review of verification results, change management procedures and results, and the accomplishment summary. The TSOA should not be granted until all software data package deficiencies are resolved and review action items are completed.

APPENDIX 4. LEVEL OF FAA INVOLVEMENT – EXAMPLE 3

1. COMPANY Z OVERVIEW: Applicant Company Z builds display devices, controllers and busses, which contain software and hardware digital devices. They have never applied for an FAA approval of any kind but would like to get their displays approved for use on the flight deck, which a preliminary safety assessment has indicated would be an essential system (Level C software). They are a small company but have investor financial support for this project. They have no SQA personnel. Their products were developed in-house by their company electronics wizards.

They are novices to FAA certification but are willing and even eager to learn. They appear prepared to commit the appropriate resources to address the certification requirements and guidance. They do not have in-house designees but plan to employ the services of a consultant DER.

The system and software design complexity is about average and the company has developed a new type of display device and controller.

2. COMPANY Z ASSESSMENT: An experienced software ASE assessed company Z using Table 2. The results of the assessment:

1 criteria score:	2	4 criteria score:	22
2 criteria score:	11	5 criteria score:	19
3 criteria score:	5	Total score result:	59

3. LEVEL OF FAA INVOLVEMENT FOR COMPANY Z: Table 3 indicates a MEDIUM level of FAA involvement for this company. Because they are novices to the certification process, however, there may be need for NRS, TS, Headquarter staff, and/or Directorate staff support for mentoring the company and evaluating the new technology. The ACO and DER can expect to guide the company through the entire certification process since they are novices, their software experience and development capability are unknown, and service history is non-existent. It is a new product and until the safety assessment is completed, the software level could be Level C, B or A, depending on the intended use of the display in the cockpit. The ACO should be involved early and throughout the project. At least 2 on-site reviews should be conducted to ensure that the company understands DO-178B compliance and other certification requirements and has implemented the processes to satisfy them. Approval of all software plans, design and verification data and accomplishment summaries should be retained by the ACO, or partially delegated only to a very qualified and experienced consultant software DER.